PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in Stator Cores for Dynamo-electric Machines.

We, CONSTRUCTIONS ELECTRIQUES DE BELGIQUE, SOCIÉTÉ ANONYME, of 29, Quai de Coronmeuse, Liége, Belgium, a company organized under the laws of Belgium, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to stators for dynamo-electric machines of the kind which comprise a number of polygonal plates arranged in staggered relation, perforations being provided in the corners of the plates for the passage of air for cooling purposes.

The object of the present invention is to construct a stator of the above type in which the cross sectional area of passage for the magnetic flux is increased without increasing the normal size of the stator.

The invention consists in a stator for dynamo-electric machines formed by a pile of regular polygonal plates the corners of which are staggered and comprise perforations provided in the corners of the said plates, characterised by the feature that, with the object of increasing the useful flux circle radius to approximately the maximum radius of a plate at the points of intersection of the plate profiles, the perforations in the projecting corners of the plates are arranged to leave additional material for the passage of the flux in these corners which compensates for the lack of material available for the flux in the corresponding non-projecting parts of an adjacent plate.

The accompanying drawings indicate some embodiments of the invention by way of example.

Figure 1 shows a cross section through the stator,

Figure 2 shows a method of stacking the plates,

Figure 3 shows another method of stacking the plates.

Figure 4 shows the upper left hand part of Figure 1, bounded by the axes A A^1 and B B^1 to a larger scale.

In the case shown in Figures 1 and 4, the points 8 represent the points of intersection of the periphery of the polygonal surfaces forming the plates shown by 6 and 7.

By placing the centering ribs of the said plates, hatched in Figure 4, in the body of the case iron frame of the machine, along the axis of the radii passing through the above mentioned points of intersection 8, it may be arranged for this centering diameter to be greater than the diameter of the circle inscribed in the polygonal figure, see Figure 1.

In order to receive the centering ribs, the plates 6 are cut away along the line 9, 10, 11 at the points of intersection, and the plates 7 along the line 12, 11. 10. Over the part 11, 10 the radius of the centering circle of all the plates is represented by 13, and is greater than the radius 14 inscribed in a plate. Without angular displacement of the plates this radius 14 would be the radius of the useful circle for the magnetic flux and it is seen that the radius of the useful circle is now increased to 13.

In the particular case shown in Figure 1, if the length of the diameter 14 is designated by d, this radius 13 is 1.082 d. This corresponds to an increase of about 8% of the diameter of the useful circle for the magnetic flux.

In order to be able to consider the diameter of this useful circle as being duly increased, it would be necessary for the part 10, 15 in each plate to have for the passage of the flux a section equal to that presented in the part 11, 10. But a part of the section for the passage of the flux corresponding to the segment limited by the straight line 10, 15 and the circular centering arc 10, 18, 15 is lost in the plate 7. Now, to compensate for this loss it is sufficient to leave in the adjacent plate 6 and outside the circular arc 10, 18, 15 in the corner 10, 18, 15, 16, 17, 9 an amount of material for the passage of the flux equivalent to this lost segment. This additional material is represented in Figure 4 by the surface bounded by the lines 10, 19, 15, 18, 10.

The free spaces left in the corners of

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the plate where the magnetic flux does not pass will now be employed for securing the ventilation and cooling of the stator. The holes will be formed in the plate 6 in the example considered, by positioning them outside the curve 10, 19, 15.

As a modification of the method described above, the perforations may be differently positioned within the corner 10, 18, 15, 16, 17, 9 of the plates on condition that they leave an effective section for the passage of the flux equivalent to the lost segment of the plate 7.

In this way the diameter of the useful circle is increased in a ratio approaching the above-mentioned theoretic increase of 8%.

The holes, on account of the superposition of the plates, form ducts and produce a cooling surface without increasing as a consequence the weight of the material used in the stator or producing a reduction in the useful section of the core. Further, as a consequence of the displacement of the plates, the cooling surface is considerably increased on account of the by-passed movements of the air flow, which can pass between the plates.

Advantage may be taken of the increase in diameter of the useful circle for the magnetic flux when designing the machine. In this way it would be possible, purely by way of example, to maintain the initial induction in the core unchanged, and increase the bore of the stator proportionally. For example an increase of 5% in the bore would give an increase in power of 10% for equal induction in the iron and density in the copper, this being obtained without increasing either the external dimensions or the weight of the iron plates comprising the stator of the machine.

It will be seen that stators composed of angularly displaced plates present the advantage that the corners of the plates are always in projection and so do not escape contact with the ventilating air flow.

The plates may be displaced with respect to each other from one to the next (Figure 2) or in sets of a number of plates (Figure 3).

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A stator for dynamo-electric machines formed by a pile of regular polygonal plates the corners of which are staggered and comprise perforations provided in the corners of the said plates, characterised by the feature that with the object of increasing the useful flux circle radius to approximately the maximum radius of a plate at the points of intersection of the plate profiles, the perforations in the projecting corners of the plates are arranged to leave additional material for the passage of the flux in these corners which compensates for the lack of material available for the flux in the corresponding non-projecting parts of an adjacent plate.

2. A stator for dynamo-electric machines as claimed in claim 1. and as described with reference to Figure 4 of the accompanying drawing, in which the perforations formed in the plates are positioned outside the curve 10, 19, 15.

3. A modification of the stator for dynamo-electric machines as claimed in claim 2, and as described with reference to Figure 4, wherein the perforations are differently positioned within the corner 10, 18, 15, 16, 17, 9, on the condition that they leave an effective section for the passage of the flux in this corner equivalent to the lost section in the adjacent plate 7.

4. A stator for dynamo-electric machines according to claim 1 in which the plates are held and centred by the ribs of the machine casing, characterised by the feature that the bearing surfaces of these ribs are formed in the neighbourhood of the afore-mentioned points of intersection.

5. The improved stator for dynamo-electric machines substantially as hereinbefore described and illustrated in the accompanying drawings.

Dated this 23rd day of July, 1930.

MARKS & CLERK.

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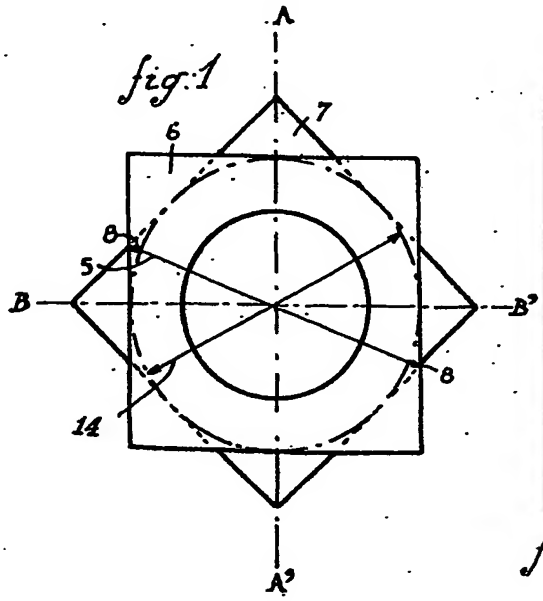

fig. 1

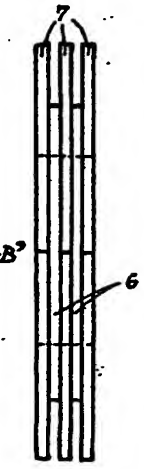

fig. 2

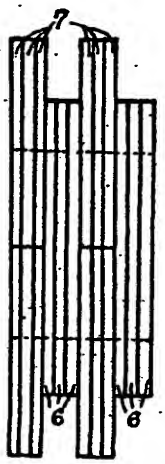

fig. 3

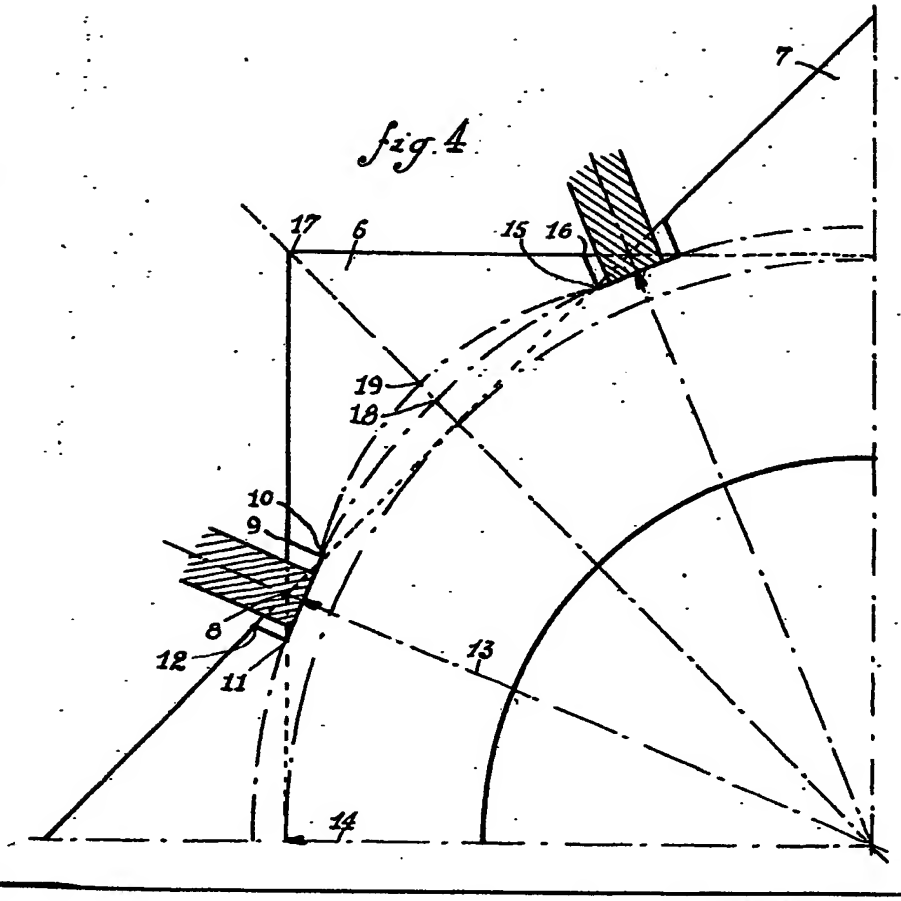

fig. 4